

A collaboration between the JAOA and the American Association of Colleges of Osteopathic Medicine (AACOM) to recruit, peer review, publish, and distribute research and other scholarly articles related to osteopathic medical education.

JAOA/AACOM

Empathy in Medicine National Norms for the Jefferson Scale of Empathy: A Nationwide Project in Osteopathic Medical Education and Empathy (POMEE)

Mohammadreza Hojat, PhD; Stephen C. Shannon, DO; Jennifer DeSantis, MEd;
Mark R. Speicher, PhD; Lynn Bragan; Leonard H. Calabrese, DO

From the Center for Research in Medical Education and Health at Sidney Kimmel Medical College at Jefferson (Philadelphia University and Thomas Jefferson University) (Dr Hojat and Ms DeSantis); the American Association of Colleges of Osteopathic Medicine (Drs Shannon and Speicher and Ms Bragan), and the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University (Dr Calabrese).

Financial Disclosure:
None reported.

Support: This study was funded by the American Association of Colleges of Osteopathic Medicine, the American Osteopathic Association, and the Cleveland Clinic.

Address correspondence to Mohammadreza Hojat, PhD, Center for Research in Medical Education and Health Care, Sidney Kimmel Medical College, 1015 Walnut St, Ste 320, Philadelphia, PA 19107-5005.

Email:
mohammadreza.hojat@jefferson.edu

Submitted February 9, 2019; revision received March 28, 2019; accepted April 3, 2019.

Context: National norms are necessary to assess individual scores from validated instruments. Before undertaking this study, no national norms were available on empathy scores. The Project in Osteopathic Medical Education and Empathy (POMEE) provided a unique opportunity to develop the first national norms for medical students.

Objective: To develop national norms for the assessments of osteopathic medical students' empathy scores on the broadly used and well-validated Jefferson Scale of Empathy (JSE) at all levels of osteopathic medical school education.

Methods: Participants were students from 41 of 48 participating campuses of osteopathic medical schools. Students were invited to complete a web-based survey, which included the JSE, in the 2017-2018 academic year.

Results: A total of 16,149 completed surveys were used to create national norm tables. Three national norm tables were developed for first-year matriculants and for students in preclinical (years 1 and 2) and clinical (years 3 and 4) phases of medical school. The norm tables allow any raw score on the JSE for male and female osteopathic medical students from matriculation to graduation to be converted to a percentile rank to assess an individual's score against national data.

Conclusions: National norms developed in this project, for men and women and at different levels of medical school education, can not only be used for the assessment of student's individual scores on the JSE, but can also serve as a supplementary measure for admissions to medical school and postgraduate medical education programs.

J Am Osteopath Assoc. 2019;119(8):520-532
doi:10.7556/jaoa.2019.091

Keywords: empathy, JSE, medical school admissions, national norms

National norms for empathy scores or for any other personality-measuring instrument in medical students have been unavailable. To address this gap, the nationwide Project in Osteopathic Medical Education and Empathy (POMEE), sponsored by the American Association of Colleges of Osteopathic Medicine (AACOM), the American Osteopathic Association, and the Cleveland Clinic,

in collaboration with the Sidney Kimmel Medical College at Jefferson (Philadelphia University and Thomas Jefferson University) and the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, was launched. The broader scope of POMEE is to explore associations between empathy in medical students and their demographics, academic background, work experiences, and career interests. The POMEE goals also include examining changes in empathetic orientation toward patient care and factors associated with positive and negative changes in empathy as students progress through medical school. This ongoing study provides a unique opportunity to develop the first national empathy score norms in osteopathic medical students using the Jefferson Scale of Empathy (JSE). The present study is part of the larger, ongoing POMEE.

Empathy and the JSE

Empathy has been identified as a major element of professionalism in medicine.¹ Cultivating empathy is among the goals of medical education and has been endorsed by professional medical organizations.^{2,3} The National Board of Osteopathic Medical Examiners lists the cultivation of humanistic behavior and exhibition of compassionate treatment, altruism, and empathy among the required competencies in the practice of osteopathic medicine.^{4(pp26-27)}

A European medical education guide⁵ suggests that assessing and enhancing personal qualities such as empathy must be considered a mandate—not just declared desirable—by leaders in medical education and medical professional organizations. Furthermore, it has been proposed that the assessment of medical school applicants' empathy should be considered a supplementary measure for admissions decisions, particularly in situations in which applicants have comparable academic qualifications.⁶

However, empathy is an elusive concept that is difficult to define and hard to quantify. To clarify the conceptual ambiguity associated with empathy, clinical

empathy in the context of health care professions education and patient care was defined as a predominantly *cognitive* (rather than an affective or emotional) attribute that involves an *understanding* (rather than a feeling) of pain and suffering of the patient combined with a capacity to *communicate* this understanding and with an *intention to help*.^{7,8} The 4 key terms in this definition are italicized to underscore their significance in the construct of clinical empathy.

Based on the aforementioned definition of clinical empathy, the JSE was developed for measuring empathy specifically in the context of medical education and patient care.⁷⁻¹⁰ Before the development of the JSE, no psychometrically sound instrument was available for measuring empathy in that context. Although a few instruments were available and used for measuring empathy in medical education research,^{7(pp57-68)} none had face and content validity in the context of patient care.^{11,12} Thus, there was a need for a content-specific and context-relevant empathy-measuring instrument. The JSE was developed in response to that need.

Researchers in the United States and abroad have accumulated an abundance of evidence in support of the psychometrics of the JSE through samples of health care professionals, allopathic medical students, and practitioners.^{7(pp84-128,276-286)} For example, statistically significant associations have been reported between allopathic medical students' scores on the JSE and ratings of clinical competence given by medical school faculty.¹³ Also, statistically significant associations were observed between students' JSE scores and ratings of clinical competence given by standardized patients in objective structured clinical examination stations.^{14,15}

More importantly, statistically significant associations have been reported between physicians' scores on the JSE and tangible clinical outcomes in diabetic patients in the United States¹⁶ and Italy.¹⁷ Although researchers at the Cleveland Clinic failed to reproduce significant associations between physician empathy and patient outcomes,¹⁸ this inability to reproduce the findings was attributed to issues related to the internal and external validity of the findings.¹⁹ Another study²⁰

in China showed that physician scores on the JSE had a mediating role in the immunocompetence of patients with advanced prostate cancer.

Also, statistically significant correlations have been reported between medical students' JSE scores and conceptually relevant measures, such as indicators of communication skills,²¹ from observations of empathetic communication patterns with standardized patients.²² In a study at the Cleveland Clinic,²³ statistically significant associations were observed between physicians' JSE scores and standardized measures of patients' communication experiences with their physicians. Also, studies have found that medical students' scores on the JSE are associated with personal qualities that are conducive to relationship building; these qualities include empathetic concern and perspective-taking^{24,25}; warmth, dutifulness, and compassion⁸; sociability²⁶; agreeableness; openness to experience; conscientiousness and extraversion²⁷; emotional intelligence²⁸⁻³⁰; cooperativeness³¹; desirable professional behavior³²; positive attitudes toward patient-centered care and orientation toward integrative patient care in osteopathic medical students³³; positive social influence³⁴; humanistic excellence by peer nomination³⁵; personal accomplishment³⁶; and orientation toward teamwork and interprofessional collaboration in allopathic³⁷ and osteopathic medical students.^{33,38}

Conversely, JSE scores were negatively correlated with personal qualities that are detrimental to relationship building, including aggression-hostility,^{26,39} indicators of burnout such as depersonalization and emotional exhaustion,^{36,40,41} and neuroticism.⁴² In a 2018 study⁴³ (using POMEE data), we found strong evidence in support of the measurement properties, underlying components, and latent variable structure of the JSE in a nationwide sample of first-year matriculants to osteopathic medical schools.

Internal consistency reliability (determined by Cronbach α) in the United States and abroad are mostly reported in magnitudes ranging from 0.70 to 0.89.^{7(pp276-286)} Stability of scores over time indicated by test-retest reliability (0.60-0.69) has been reported

in physicians¹⁰ and in osteopathic medical students who participated in POMEE (Hojat et al, unpublished data, 2019). These studies²⁴⁻⁴³ provide strong evidence of the validity and reliability of the JSE. The JSE has been translated into 56 languages and is used in more than 85 countries.⁷ Because of its worldwide use and extensive psychometric support, the JSE has been recognized as the most researched⁴⁴ and widely used instrument in medical education research.⁴⁵

National Norms

Norms are performance data based on large representative samples from well-defined target populations that are used as references to assess, interpret, or place individual performance against the corresponding normative populations. Development of national norms requires pertinent data collected from nationwide and representative samples from target populations. The present study aimed to develop the first national norm tables for the assessment of osteopathic medical students' scores on the JSE.

Methods

Participants

Forty-one of 48 campuses of US colleges of osteopathic medicine participated in this project, representing 85% of all osteopathic college campuses in the country at that time. Student participants were broken into 5 samples: first-year matriculants who responded to the study survey at the beginning of the 2017-2018 academic year (sample 1) and first-year students (sample 2), second-year students (sample 3), third-year students (sample 4), and fourth-year students (sample 5) who completed the study survey at the end of the 2017-2018 academic year.

Survey

The web-based survey consisted of questions about respondents' demographics (age, gender, race/ethnicity), academic background, career interest, work

experience before medical school, and year of medical school education, plus the following 2 scales:

- **The JSE S-Version** The JSE is a 20-item instrument for measuring empathy in the context of health care professionals' education and patient care. Items are answered on a 7-point Likert-type scale (1=strongly disagree, 7=strongly agree). The JSE S-Version, or medical student version, was used.
- **Infrequency Scale of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ)**⁴⁶ This 10-item scale uses true/false responses to identify respondents with invalid records. For example, one item is, "I never met a person that I didn't like." Scores higher than 3 on this scale indicate questionable validity of the respondent's record.^{46(p383)} This scale has previously been used with medical students to detect and control for the tendency to make "good impression" responses.^{7,26}

One of the shortcomings of self-reported personality surveys is the confounding effect of good impression response bias. Respondents can manipulate their answers to produce good impressions. Such attempts to present oneself in a more socially acceptable light is known as the "social desirability response set." Because most items of the JSE are transparent, they can be answered in a way that seems more socially acceptable. Such attempts to manipulate responses can confound research findings and lead to invalid conclusions. A unique feature of the POMEE study was the statistical control for the confounding effect of good impression response bias on the JSE scores using the Infrequency Scale of the ZKPQ, which allowed us to identify and remove those with exaggerated good impression response bias from data used to develop norm tables.

Procedures

The study survey underwent several iterations and 2 pilot testings (alpha and beta). The purpose of the alpha testing was to improve the clarity and comprehensiveness of the study survey; reviewers included medical education researchers and medical students.

The purpose of the beta testing was to detect any possible bugs or crashes in its online administration and to explore the limits of the web-based product when using different desktop and mobile devices. Participants in beta testing were mostly student volunteers from 1 allopathic and 1 osteopathic medical school.

The Jefferson team submitted the institutional review board application for the project to the institutional review board of Thomas Jefferson University. An exemption status was granted. All participating colleges submitted applications to their own institutional review board and received approval related to human subjects research.

We arranged to have 1 or 2 senior administrators or faculty-level research coordinators from each participating college to serve as a liaison between the college and research teams at AACOM and Jefferson. These liaisons, who also administered the web-based survey at their college campuses, proved to be vital to the project.⁴⁷

Reminders to complete the survey were sent 1, 2, and up to 3 weeks after the initial invitation was sent. Surveys were considered usable and were included in the study if respondents provided year of medical school education and responded to at least 16 items of the JSE and all items of the Infrequency scale.

Statistical Analyses

We used the *t* test for comparing mean differences in age between each sample and its respective population. We also used the *z* test for proportions to compare gender composition of samples and their respective population. Additionally, the χ^2 test was used to determine goodness of fit on race/ethnicity of samples and populations. Statistical significance was set at $P < .05$. For determining the practical (or *clinical*) significance of the findings, we considered any effect size estimate of 0.20 or less as practically unimportant, regardless of statistical significance.^{48,49}

Results

We received 16,760 usable surveys. The usable sample of first-year matriculants represented 83% (n=6009) of

Table 1. Age, Gender, and Race/Ethnicity Comparisons of the Study Samples With Respective Populations^a in National Samples From 41 Campuses of US Colleges of Osteopathic Medicine

	First-Year Matriculants ^b		Year 1 ^c		Year 2 ^c		Year 3 ^c		Year 4 ^c	
	Sample (n=6009)	Population (n=7197)	Sample (n=3616)	Population (n=7197)	Sample (n=2764)	Population (n=6778)	Sample (n=2413)	Population (n=6683)	Sample (n=1958)	Population (n=4894)
Age,^d y										
Mean (SD)	24.8 (3.4)	25.1 (3.1)	25.5 (3.2)	25.8 (3.1)	26.3 (3.2)	26.8 (3.2)	27.4 (3.4)	27.8 (3.2)	28.6 (3.5)	29.0 (3.4)
Range	19-51	19-51	20-50	20-52	20-56	20-59	23-55	23-55	24-53	18-62
Gender,^e No. (%)										
Men	3175 (53%)	3934 (55%)	1839 (51%)	3934 (55%)	1348 (49%)	3661 (54%)	1198 (50%)	3683 (55%)	966 (49%)	2566 (52%)
Women	2795 (47%)	3255 (45%)	1738 (48%)	3255 (45%)	1383 (50%)	3102 (46%)	1180 (49%)	2937 (44%)	970 (50%)	2087 (43%)
Race/Ethnicity, No. (%)										
White/Caucasian	3618 (60%)	4049 (56%)	2283 (63%)	4049 (56%)	1805 (65%)	3952 (58%)	1609 (67%)	4117 (62%)	1325 (68%)	3180 (65%)
Black/African American	216 (4%)	266 (4%)	107 (3%)	266 (4%)	83 (3%)	217 (3%)	78 (3%)	244 (4%)	56 (3%)	120 (2%)
Hispanic/Latino/Spanish	337 (6%)	448 (6%)	207 (6%)	448 (6%)	114 (4%)	340 (5%)	100 (4%)	337 (5%)	64 (3%)	74 (2%)
Asian	1627 (27%)	1914 (27%)	842 (23%)	1914 (27%)	607 (22%)	1798 (27%)	470 (19%)	1681 (25%)	385 (20%)	406 (8%)
Other/no response	211 (3%)	520 (7%)	177 (5%)	520 (7%)	155 (6%)	471 (7%)	156 (6%)	304 (5%)	128 (6%)	1114 (23%)

^a Population data were taken from AACOM prematriculation surveys for students in years 1-3 and from the AACOM exit survey in year 4.

^b First-year matriculants who completed the study survey at the beginning of the 2017-2018 academic year.

^c Students in the first, second, third, and fourth years who completed the study survey at the end of the 2017-2018 academic year.

^d Students who did not specify their age information or who were outside the population age range were excluded (approximately 1%).

^e Students who did not specify their gender or who reported other gender categories were excluded (5% or less).

^f Students who specified their race/ethnicity as American Indian/Alaskan or Hawaiian/Pacific Islander were included in the "Other" category (approximately 1%).

its respective population. Usable samples for the first-, second-, third-, and fourth-year students represented 50% (n=3616), 41% (n=2764), 36% (n=2413), and 40% (n=1958) of their respective populations.

Demographics

The mean age was 24.8 years for first-year matriculants, and the mean ages increased progressively by about 1 year for each class in medical school (25.5, 26.3, 27.4, and 28.6 in years 1-4, respectively). About half of the students in each group were men (53%, 51%, 49%, 50%, and 49% in first-year matriculants and in years 1-4, respectively). Only 1% or less of the students

in each group self-identified as transgender, gender variant/nonconforming, or declined to answer.

The majority of respondents were white/Caucasian (60%-68%), followed by Asian (19%-27%), Hispanic/Latino/Spanish (3%-6%), and black/African American (3%-4%) (Table 1).

Study Samples and Their Respective Populations

We compared age, gender, and race/ethnicity of the usable samples with their respective populations using AACOM data to examine representativeness of the study samples. The study samples closely resembled

their respective populations with regard to age, gender, and race/ethnicity. The means of students' ages in each of the 5 samples and their respective populations were very similar. However, results of *t* tests comparing sample and population mean ages showed statistically significant differences ($P < .01$) that can be attributed to the large size of the samples. However, the magnitudes of the effect size estimates of the mean differences were lower than 0.20, indicating a lack of clinically important differences.^{48,49}

Gender proportions were also similar between samples and their respective populations. Although the results of the *z* tests for proportions were statistically significant ($P < .01$), the magnitude of none of the effect size estimates for proportions (by using the arcsine transformation) reached the 0.20 mark, indicating that the observed differences in gender proportions between samples and their respective populations were clinically unimportant.

Similarly, composition of race/ethnicity was similar between the study samples and their respective populations, with one exception. There was a substantial 12% difference in the Asian ethnic group in the fourth-year students (20% in the sample and 8% in the population). However, a reverse change was also observed for fourth-year students in the "other/no response" category (6% of the sample and 23% of the population). The effect size estimates of the goodness of fit tests showed values less than 0.20 for all of the study samples, with the exception of the fourth-year students, for whom the effect size was 0.67, most likely due to a discrepancy between proportions of self-reported Asian students in the sample and its respective population.

Norm Tables Samples Used

To minimize confounding factors in creating the national norm tables, we excluded students (2%-3%) who scored higher than 3 on the Infrequency Scale of the ZKPQ. Also, because of notable gender differences in empathy reported in many studies with medical students,^{7(pp169-187),8,10,13,50} including POMEE, we

excluded those who did not specify their gender as male or female (<1%) from the data used in preparing each of the norm tables and those who scored higher than 3 on the Infrequency Scale of the ZKPQ.

We combined first- and second-year students in a single corresponding national norm table for preclinical students because JSE means (SDs) and score distributions were similar for students in these 2 years (115.0 [12.5] in the first year and 114.7 [12.1] in the second year). Similarly, a single corresponding national norm table for students in the clinical phase of medical school was created because JSE means (SDs) and score distributions were similar for third- and fourth-year students (113.4 [13.0] in the third year and 113.0 [13.2] in the fourth year). Final samples used in the national norm tables included 5818 first-year matriculants (3071 men and 2747 women) (**Table 2**); 6115 students (3042 men and 3073 women) in the preclinical phase (**Table 3**); and 4216 students (2099 men and 2117 women) in the clinical phase of medical school (**Table 4**).

Interpreting the National Norm Tables

Because of the notable gender difference on the JSE, we took students' gender into consideration in the development of norm tables by preparing percentile ranks for men and women separately. If a student's gender is known, we strongly recommend using the corresponding gender-related percentile ranks from the norm tables. If a student's gender is unknown, then the percentile rank on the norm tables for men and women combined can be used as an estimate.

The following guidelines can be used to determine the percentile rank of an individual's JSE score. First, locate the student's raw empathy score interval in the first column of the appropriate national norm table. Then, move across the row to locate the score's corresponding percentile rank in the column that corresponds to the student's gender. For example, if a score of 125 is obtained by a third-year male student, first find the raw score interval (125-126) by looking in the first column of **Table 4**, then find the corresponding percentile rank for that score interval by looking across

Table 2.
National Norms for the JSE S-Version: First-Year Matriculants in a National Sample From 41
Campuses of US Colleges of Osteopathic Medicine at the Beginning of Medical School^a

JSE Raw Score	Men (n=3071)			Women (n=2747)			Combined (n=5818)		
	f	cf	Percentile Rank	f	cf	Percentile Rank	f	cf	Percentile Rank
≤ 80	19	19	<1	5	5	<1	24	24	<1
81-82	12	31	1	2	7	<1	14	38	1
83-84	7	38	1	1	8	<1	8	46	1
85-86	8	46	1	3	11	<1	11	57	1
87-88	8	54	2	5	16	<1	13	70	1
89-90	24	78	2	5	21	1	29	99	1
91-92	26	104	3	5	26	1	31	130	2
93-94	34	138	4	8	34	1	42	172	3
95-96	31	169	5	21	55	2	52	224	3
97-98	70	239	7	30	85	3	100	324	5
99-100	79	318	9	35	120	4	114	438	7
101-102	102	420	12	34	154	5	136	574	9
103-104	125	545	16	70	224	7	195	769	12
105-106	139	684	20	78	302	10	217	986	15
107-108	183	867	25	110	412	13	293	1279	19
109-110	199	1066	31	115	527	17	314	1593	25
111-112	211	1277	38	153	680	22	364	1957	31
113-114	218	1495	45	147	827	27	365	2322	37
115-116	221	1716	52	204	1031	34	425	2747	44
117-118	203	1919	59	207	1238	41	410	3157	51
119-120	208	2127	66	237	1475	49	445	3602	58
121-122	198	2325	72	211	1686	58	409	4011	65
123-124	175	2500	79	212	1898	65	387	4398	72
125-126	144	2644	84	203	2101	73	347	4745	79
127-128	119	2763	88	206	2307	80	325	5070	84
129-130	89	2852	91	161	2468	87	250	5320	89
131-132	92	2944	94	117	2585	92	209	5529	93
133-134	59	3003	97	82	2667	96	141	5670	96
135-136	37	3040	98	48	2715	98	85	5755	98
137-138	16	3056	99	28	2743	99	44	5799	99
139-140	15	3071	>99	4	2747	>99	19	5818	>99

^a Excluded were respondents who did not specify their gender as "male" or "female" (<1%) and those who scored >3 on the Infrequency Scale of the Zuckerman-Kuhlman Personality Questionnaire (for identifying respondents who attempted to make a good impression).

Abbreviations: cf, cumulative frequency; f, frequency; JSE S-Version, Jefferson Scale of Empathy medical student version.

Source: This table is reproduced from Hojat et al, 2018.

Table 3.
National Norms for the JSE S-Version: First- and Second-Year Osteopathic Medical Students
(Preclinical Years) in National Samples From 41 Campuses of US Colleges of Osteopathic Medicine^a

JSE Raw Score	Men (n=3042)			Women (n=3073)			Combined (n=6115)		
	f	cf	Percentile Rank	f	cf	Percentile Rank	f	cf	Percentile Rank
≤ 80	58	58	2	10	10	<1	68	68	1
81-82	19	77	2	2	12	<1	21	89	1
83-84	18	95	3	9	21	1	27	116	2
85-86	19	114	3	5	26	1	24	140	2
87-88	22	136	4	6	32	1	28	168	3
89-90	36	172	5	15	47	1	51	219	3
91-92	35	207	6	13	60	2	48	267	4
93-94	46	253	8	19	79	2	65	332	5
95-96	62	315	9	18	97	3	80	412	6
97-98	77	392	12	40	137	4	117	529	8
99-100	82	474	14	39	176	5	121	650	10
101-102	100	574	17	65	241	7	165	815	12
103-104	152	726	21	93	334	9	245	1060	15
105-106	163	889	27	99	433	12	262	1322	19
107-108	163	1052	32	126	559	16	289	1611	24
109-110	182	1234	38	138	697	20	320	1931	29
111-112	189	1423	44	173	870	25	362	2293	35
113-114	201	1624	50	185	1055	31	386	2679	41
115-116	195	1819	57	201	1256	38	396	3075	47
117-118	205	2024	63	219	1475	44	424	3499	54
119-120	181	2205	70	230	1705	52	411	3910	61
121-122	167	2372	75	257	1962	60	424	4334	67
123-124	152	2524	80	239	2201	68	391	4725	74
125-126	136	2660	85	204	2405	75	340	5065	80
127-128	103	2763	89	190	2595	81	293	5358	85
129-130	87	2850	92	175	2770	87	262	5620	90
131-132	81	2931	95	149	2919	93	230	5850	94
133-134	51	2982	97	82	3001	96	133	5983	97
135-136	28	3010	98	43	3044	98	71	6054	98
137-138	22	3032	99	19	3063	99	41	6095	99
139-140	10	3042	>99	10	3073	>99	20	6115	>99

^a Excluded were respondents who did not specify their gender as "male" or "female" (1%) and those who scored >3 on the Infrequency Scale of the Zuckerman-Kuhlman Personality Questionnaire (for identifying respondents who attempted to make a good impression).

Abbreviations: cf, cumulative frequency; f, frequency; JSE S-Version, Jefferson Scale of Empathy medical student version.

Table 4.
National Norms for the JSE-S Version: Third- and Fourth-Year Osteopathic Medical Students (Clinical Years) in National Samples From 41 Campuses of US Colleges of Osteopathic Medicine^a

JSE Raw Score	Men (n=2099)			Women (n=2117)			Combined (n=4216)		
	f	cf	Percentile Rank	f	cf	Percentile Rank	f	cf	Percentile Rank
≤ 80	64	64	3	14	14	1	78	78	2
81-82	15	79	3	5	19	1	20	98	2
83-84	13	92	4	7	26	1	20	118	3
85-86	21	113	5	4	30	1	25	143	3
87-88	19	132	6	5	35	2	24	167	4
89-90	27	159	7	9	44	2	36	203	4
91-92	39	198	9	13	57	2	52	255	5
93-94	28	226	10	13	70	3	41	296	7
95-96	39	265	12	21	91	4	60	356	8
97-98	51	316	14	36	127	5	87	443	9
99-100	74	390	17	37	164	7	111	554	12
101-102	90	480	21	56	220	9	146	700	15
103-104	77	557	25	62	282	12	139	839	18
105-106	118	675	29	67	349	15	185	1024	22
107-108	124	799	35	117	466	19	241	1265	27
109-110	137	936	41	97	563	24	234	1499	33
111-112	126	1062	48	130	693	30	256	1755	39
113-114	108	1170	53	156	849	36	264	2019	45
115-116	145	1315	59	166	1015	44	311	2330	52
117-118	134	1449	66	162	1177	52	296	2626	59
119-120	141	1590	72	147	1324	59	288	2914	66
121-122	120	1710	79	154	1478	66	274	3188	72
123-124	96	1806	84	130	1608	73	226	3414	78
125-126	78	1884	88	136	1744	79	214	3628	84
127-128	65	1949	91	126	1870	85	191	3819	88
129-130	53	2002	94	97	1967	91	150	3969	92
131-132	39	2041	96	60	2027	94	99	4068	95
133-134	31	2072	98	47	2074	97	78	4146	97
135-136	4	2076	99	30	2104	99	34	4180	99
137-138	14	2090	99	9	2113	>99	23	4203	99
139-140	9	2099	>99	4	2117	>99	13	4216	>99

^a Excluded were respondents who did not specify their gender as "male" or "female" (<1%), and those who scored >3 on the Infrequency Scale of the Zuckerman-Kuhlman Personality Questionnaire (for identifying respondents who attempted to make a "good impression").

Abbreviations: cf, cumulative frequency; f, frequency; JSE S-Version, Jefferson Scale of Empathy medical student version.

the 125-126 row until reaching the column showing the percentile rank for men, which reads 88%. This percentile rank means that a score of 125 on the JSE for a third-year male student places him in the 88th percentile of all male students in that population. In other words, 88% of the male students in this norm group scored below 125. Using the same guidelines, a third-year female student with a similar score will be placed in the 79th percentile.

Discussion

This study, as part of the larger nationwide POMEE with a broader scope (Hojat et al, unpublished data, 2019) is the first of its kind, to our knowledge, to be undertaken in medical education research. It is unique in its scope because it includes a large national sample of medical students at all levels of medical school education, from first-year matriculation before exposure to formal medical education to completion of medical school. We believe the rich nationwide data in the POMEE database will serve to address a number of issues of interest to medical education researchers, beginning with the national norms for osteopathic medical students at all levels of medical school. Future studies are underway to improve our understanding of relationships between empathy scores and demographic variables (age, gender, race/ethnicity), undergraduate major, career interest, and employment experience before medical school. Patterns of changes in empathy scores in different years of osteopathic medical school compared with findings in allopathic medical students will also be explored.

Among the strengths of this ground-breaking study are that it uses large and representative samples at all levels of medical education; it uses a well-established empathy-measuring instrument specifically developed for administration to medical students with face and content validities and strong psychometric support in allopathic and osteopathic medical students; and it controls for good impression response bias. One limitation of this study is relatively low response rates (<50%) in samples of second-, third- and fourth-year students.

However, this limitation is mitigated by support for the representativeness of the samples based on gender, age, and race/ethnicity.

In a cross-sectional study of a single institution, Rizkalla and Henderson⁵¹ found that osteopathic medical students in preclinical years of training (years 1 and 2) had similar empathy scores and that students in clinical years of training (years 3 and 4) also had similar empathy scores. Similar findings in POMEE led us to group first- and second-year osteopathic medical students and third- and fourth-year osteopathic medical students into preclinical and clinical norm tables, respectively. However, we must emphasize that the national norm tables developed in this study can only be used for osteopathic medical students. Different sets of norms should be created for allopathic and other health professions students.

The national norms developed in this study have important implications for assessing osteopathic medical students' individual and group scores against national norms. Percentile ranks in norm tables corresponding to students' raw scores can provide supplementary measures for admissions to medical school or to postgraduate medical education programs. Medical schools and postgraduate medical education programs are accountable to select qualified applicants with the best potential to become caring physicians.⁶ Traditional admission measures (eg, Medical College Admission Test, undergraduate grade point averages) may help in selecting those who can successfully pass examinations of recalling factual knowledge in the early years of medical school, but are not predictive of caring for the patient. The contention that admission interviews, letters of recommendation, essays, and personal statements can reliably assess personal qualities such as caring attitudes and empathetic orientation awaits empirical verification.⁵ We believe that the assessment of empathy from using the norm tables reported in the present study can be helpful to fill this gap. Concern about the possibility of a respondent's attempt to fake responses in self-reported tests such as the JSE can be addressed by using approaches to

detect the social desirability response set, or the good impression response bias measured by using the Infrequency Scale of the ZKPQ in the present study.

Looking forward, we believe national norms could serve as a tie-breaker for applicants with similar academic qualifications. Moreover, the national norm tables could help to identify the degree of students' need for remedial education to improve their empathy. In addition, national norms tables could potentially be used to assess the outcomes of educational programs, interventions, or remedies implemented in different years of osteopathic medical school training. Thus, not only can these norm tables be used to assess individuals' scores against national data, but they can also help to evaluate group changes in percentile ranks over time to assess outcomes of targeted educational programs. Further research is needed to investigate these and other uses of the national norm tables for osteopathic medical students.

Conclusion

Interest in recognizing, assessing, and enhancing empathy among health care professionals is increasing, particularly as studies uncover improved educational and patient outcomes associated with increased empathy in health professions students and practitioners. The national norm tables for osteopathic medical students reported in this nationwide study provide a compass for colleges of osteopathic medicine as they review admissions criteria and student performance. Further research in the POMEE's ongoing national longitudinal study will evaluate changes in empathy scores over time and will elucidate specific educational and institutional factors that are associated with positive and negative changes as students progress through medical school.

Acknowledgments

We thank the many people who contributed to this project, especially those who made a significant contribution to this project's success: members of the AACOM team, especially Thomas Levitan, MEd, who was instrumental at the onset of this project in developing the survey instrument; Jefferson research team colleagues Shira Carroll, BS; Daniel Z. Louis, MS;

J. Jon Veloski, MS; and Vittorio Maio, PharmD, MS, MSPH; Tracy Treadway; and Luke Kedziora, BS, at the Jefferson Department of Information Services and Technology, who helped us in preparing the web-based research survey for online administration and correcting computer glitches during and after pilot testing; deans of participating Colleges of Osteopathic Medicine and each of the research coordinators from participating college campuses (listed here in alphabetic order): Michael Becker, DO; Joe Bianco, PhD; Linda Boyd, DO; Joseph Brewer, PhD; Lisa Carroll, MD; Mark Clark, PhD; Karen Clayton, PhD; Glenn E. Davis, PhD; Robyn Dreibelbis, DO; Kyle Henderson, PhD; Ana Maria Homs, PsyD; Justina Hyfantis, PhD; Britt Johnson, PhD; Gretchen Lovett, PhD; Susan Mackintosh, DO; Elizabeth McClain, PhD; Edward Magalhaes, PhD; Patience Mason, MEd; Terrence Miller, PhD; Malcolm Modrzakowski, PhD; David Mokler, PhD; Bruce Newton, PhD; Lorree Ratto, PhD; Sean Reeder, DO; Mireille Rizkalla, PhD; Raquel Malina Romanick, JD; Miko Rose, DO; Katherine Ruger, EdD; Amy Schlueter, MPA; Trish Sexton, DHEd, MS; Dana Shaffer, DO; Robert Sorrells, PhD; Vivian Stevens, PhD; Mary Ann Taylor, PhD; Clinton Whitson, MS; and Rynn Ziller, EdD. We are also thankful to Dorissa Bolinski, BA; and Pamela Walter, MFA, for editorial polishing of this article. Last, but not least, we give special thanks to all of the thousands of osteopathic medical students in the academic year of 2017-2018 who made history in medical education research by voluntarily and willingly completing and submitting the online survey of this project.

References

1. Veloski J, Hojat M. Measuring specific elements of professionalism: empathy, teamwork, and lifelong learning. In: Stern DT, ed. *Measuring Medical Professionalism*. Oxford, UK: Oxford University Press; 2006:117-145.
2. Learning objectives for medical student education—guidelines for medical schools: report I of the medical school objectives project. *Acad Med*.1999;74(1):13-18.
3. Evaluation of humanistic qualities in the internist. *Ann Intern Med*. 1983;99(5):720-724. doi:10.7326/0003-4819-99-5-720
4. National Board of Osteopathic Medical Examiners (NBOME). *Fundamental Osteopathic Medical Competency Domains*. Chicago, IL: National Board of Osteopathic Medical Examiners; 2011. <https://www.nbome.org/docs/NBOME%20Fundamental%20Osteopathic%20Medical%20Competencies.pdf>. Accessed June 19, 2019.
5. Hojat M, Erdmann JB, Gonnella JS. Personality assessments and outcomes in medical education and the practice of medicine: AMEE Guide No. 79. *Med Teach*. 2013;35(7):e1267-e1301. doi:10.3109/0142159X.2013.785654
6. Hojat M. Assessments of empathy in medical school admissions: what additional evidence is needed [editorial]? *Int J Med Educ*.2014;5:7-10. doi:10.5116/ijme.52b7.5294
7. Hojat M. *Empathy in Health Professions Education and Patient Care*. New York, NY: Springer International; 2016.
8. Hojat M, Mangione S, Nasca TJ, et al. The Jefferson Scale of Physician Empathy: development and preliminary psychometric data. *Educ Psychol Meas*. 2001;61(2):349-365. doi:10.1177/00131640121971158
9. Hojat M, Gonnella JS, Nasca TJ, Mangione S, Veloski JJ, Magee M. The Jefferson Scale of Physician Empathy: further psychometric data

- and differences by gender and specialty at item level. *Acad Med.* 2002;77(10 suppl):S58-S60.
10. Hojat M, Gonnella JS, Nasca TJ, Mangione S, Vergare M, Magee M. Physician empathy: definition, components, measurement, and relationship to gender and specialty. *Am J Psychiatry.* 2002;159(9):1563-1569.
 11. Hojat M, Gonnella JS. In reply to Quinn and Zelenski [letter]. *Acad Med.* 2017;92(9):1219. doi:10.1097/ACM.0000000000001853
 12. Hojat M. Change in empathy in medical school [letter]. *Med Educ.* 2018;52(4):456-457. doi:10.1111/medu.13497
 13. Hojat M, Gonnella JS, Mangione S, et al. Empathy in medical students as related to academic performance, clinical competence and gender. *Med Educ.* 2002;36(6):522-527. doi:10.1046/j.1365-2923.2002.01234.x
 14. Berg K, Majdan JF, Berg D, Veloski J, Hojat M. A comparison of students' self-reported empathy with simulated patients' assessment of the students' empathy. *Med Teach.* 2011;33(5):388-391. doi:10.3109/0142159x.2010.530319
 15. Berg K, Blatt B, Lopreiato J, et al. Standardized patient assessment of medical student empathy: ethnicity and gender effects in a multi-institutional study. *Acad Med.* 2015;90(1):105-111. doi:10.1097/ACM.0000000000000529
 16. Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS. Physicians' empathy and clinical outcomes in diabetic patients. *Acad Med.* 2011;86(3):359-364. doi:10.1097/ACM.0b013e3182086fe1
 17. Del Canale S, Louis DZ, Maio V, et al. The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Acad Med.* 2012;87(9):1243-1249. doi:10.1097/ACM.0b013e3182628fbf
 18. Chaitoff A, Rothberg MB, Windover AK, Calabrese L, Misra-Hebert AD, Martinez KA. Physician empathy is not associated with laboratory outcomes in diabetes: a cross-sectional study. *J Gen Intern Med.* 2019;34(1):75-81. doi:10.1007/s11606-018-4731-0
 19. Hojat M, Maio V, Markham FW, Louis DZ, Gonnella JS. Physician empathy and diabetic outcomes [letter to the editor]. *J Gen Intern Med.* In press.
 20. Yang N, Xiao H, Wang W, Li S, Yan H, Wang Y. Effects of doctors' empathy abilities on the cellular immunity of patients with advanced prostate cancer treated by orchiectomy: The mediating role of patients' stigma, self-efficacy, and anxiety. *Patient Prefer Adherence.* 2018;12:1305-1314. doi:10.2147/PPA.S166460
 21. LaNoue MD, Roter DL. Exploring patient-centeredness: the relationship between self-reported empathy and patient-centered communication in medical trainees. *Patient Educ Couns.* 2018;101(6):1143-1146. doi:10.1016/j.pec.2018.01.016
 22. Roter D, Larson S. The Roter interaction analysis system (RIAS): utility and flexibility for analysis of medical interactions. *Acad Med.* 2002;46(4):243-251. doi:10.1016/S0738-3991(02)00012-5
 23. Chaitoff A, Sun B, Windover A, et al. Associations between physician empathy, physician characteristics, and standardized measures of patient experience. *Acad Med.* 2017;92(10):1464-1471. doi:10.1097/ACM.0000000000001671
 24. Hojat M, Mangione S, Kane G, Gonnella JS. Relationships between scores of the Jefferson Scale of Physician Empathy (JSPE) and the Interpersonal Reactivity Index (IRI). *Med Teach.* 2005;27(7):625-628. doi:10.1080/01421590500069744
 25. Costa P, de Carvalho-Filho MA, Schweller M, et al. Measuring medical students' empathy: exploring the underlying constructs of and associations between two widely used self-report instruments in five countries. *Acad Med.* 2017;92(6):860-867. doi:10.1097/ACM.0000000000001449
 26. Hojat M, Zuckerman M, Magee M, et al. Empathy in medical students as related to specialty interest, personality, and perception of mother and father. *Pers Individ Dif.* 2005;39(7):1205-1215. doi:10.1016/j.paid.2005.04.007
 27. Costa P, Alves R, Neto I, Marvão P, Portela M, Costa MJ. Associations between medical student empathy and personality: a multi-institutional study. *PLoS One.* 2014;9(3):e89254. doi:10.1371/journal.pone.0089254
 28. Arora S, Ashrafiyan H, Davis R, Athanasiou T, Darzi A, Sevdalis N. Emotional intelligence in medicine: a systematic review through the context of the ACGME competencies. *Med Educ.* 2010;44(8):749-764. doi:10.1111/j.1365-2923.2010.03709.x
 29. Austin EJ, Evans P, Goldwater R, Potter V. A preliminary study of emotional intelligence, empathy and exam performance in first year medical students. *Pers Individ Dif.* 2005;39(8):1395-1405. doi:10.1016/j.paid.2005.04.014
 30. Kliszcz J, Nowicka-Sauer K, Trzeciak B, Nowak P, Sadowska A. Empathy in health care providers—validation study of the Polish version of the Jefferson Scale of Empathy. *Adv Med Sci.* 2006;51:219-225.
 31. Hong M, Bahn GH, Lee WH, Moon SJ. Empathy in Korean psychiatric residents. *Asia-Pacific Psychiatry.* 2011;3:83-90.
 32. Brazeau CMLR, Schroeder R, Rovi S, Boyd L. Relationship between medical student burnout, empathy, and professionalism climate. *Acad Med.* 2010;85(10):s33-s36. doi:10.1097/ACM.0b013e318181ed4c47
 33. Hojat M, Bianco JA, Mann D, Massello D, Calabrese LH. Overlap between empathy, teamwork and integrative approach to patient care. *Med Teach.* 2015;37(8):755-758. doi:10.3109/0142159x.2014.971722
 34. Hojat M, Michalec B, Veloski J, Tykocinski ML. Can empathy, other personality attributes, and level of positive social influence in medical school identify potential leaders in medicine? *Acad Med.* 2015;90(4):505-510. doi:10.1097/ACM.0000000000000652
 35. Pohl CA, Hojat M, Arnold L. Peer nominations as related to academic attainment, empathy, and specialty interest. *Acad Med.* 2011;86(6):747-751. doi:10.1097/ACM.0b013e318217e464
 36. Hojat M, Vergare M, Isenberg G, Cohen M, Spandorfer J. Underlying construct of empathy, optimism, and burnout in medical students. *Int J Med Educ.* 2015;6:12-16. doi:10.5116/ijme.54c3.60cd
 37. Hojat M, Spandorfer J, Isenberg G, Vergare M, Fassih R. Psychometrics of the scale of attitudes toward physician-pharmacist collaboration: a study with medical students. *Med Teach.* 2012;34(12):e833-e837. doi:10.3109/0142159X.2012.714877
 38. Calabrese LH, Bianco JA, Mann D, Massello D, Hojat M. Correlates and changes in empathy and attitudes toward interprofessional collaboration in osteopathic medical students. *J Am Osteopath Assoc.* 2013;113(12):898-907. doi:10.7556/jaoa.2013.068
 39. Hasan S, Al-Sharqawi N, Dashti F, et al. Level of empathy among medical students in Kuwait University, Kuwait. *Med Princ Pract.* 2013;22(4):385-389. doi:10.1159/000348300
 40. Lamothe M, Boujut E, Zenasni F, Sultan S. To be or not to be empathic: the combined role of empathic concern and perspective taking in understanding burnout in general practice. *BMC Family Practice.* 2014;15:15. doi:10.1186/1471-2296-15-15

41. Zenasni F, Boujut E, de Vaure B, et al. Development of a French-language version of the Jefferson Scale of Physician Empathy and association with practice characteristics and burnout in a sample of general practitioners. *Int J Pers Cent Med*. 2012;2(4):759-766.
42. L. Xia, S. Hongyu, Xinwei F. Study on correlation between empathy ability and personality characteristics of undergraduate nursing students. *Chinese Nursing Research*. 2011;32:2933-2935.
43. Hojat M, DeSantis J, Shannon SC, et al. The Jefferson Scale of Empathy: a nationwide study of measurement properties, underlying components, latent variable structure, and national norm in medical students. *Adv Health Sci Educ Theory Pract*. 2018;23(5):899-920. doi:10.1007/s10459-018-9839-9
44. Colliver JA, Conlee MJ, Verhulst SJ, Dorsey JK. Rebuttals to critics of studies of the decline on empathy [letter]. *Acad Med*. 2010;85(12):1813-1814. doi:10.1097/ACM.0b013e3181faa3ed
45. Sulzer SH, Feinstein NW, Wendland, CI. Assessing empathy development in medical education: a systemic review. *Medical Education*, 2016;50:300-310. doi:10.1111/medu.12806
46. Zuckerman M. Zuckerman-Kuhlman Personality Questionnaire (ZKPQ): An alternative five-factorial model. In: DeRaad B, Perugini M, eds. *Big Five Assessment*. Seattle, WA: Hogrefe & Huber; 2002:377-396.
47. Newton BW. Insights on the Nationwide Project in Osteopathic Medical Education and Empathy (POME). *J Am Osteopath Assoc*. 2018;118(6):e28-e32. doi:10.7556/jaoa.2018.076
48. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1987.
49. Hojat M, Xu G. A visitor's guide to effect sizes: statistical significance versus practical (clinical) importance of research findings. *Adv Health Sci Educ Theory Pract*. 2004;9(3):241-249.
50. Hojat M, Gonnella JS. Eleven years of data on the Jefferson Scale of Empathy-medical student version (JSE-S): Proxy norm data and tentative cutoff scores. *Med Princ Pract*. 2015;24(4):344-350. doi:10.1159/000381954
51. Rizkalla MN, Henderson KK. Empathy and osteopathic manipulative medicine: is it all in the hands? *J Am Osteopath Assoc*. 2018;118(9):573-585. doi:10.7556/jaoa.2018.131

© 2019 American Osteopathic Association

JAOA Submissions: Online-Only Content

Videos and slides can be great supplemental components to published research. *The Journal of the American Osteopathic Association* encourages authors to include such online-only content with their manuscript submissions. Email jaoa@osteopathic.org for more information.